

Active Wake Control Implementation for Clusters of Wind Farms

Publieke samenvatting / Public summary

Aanleiding

The wake effect refers to the aerodynamic interaction between wind turbines in a farm. As the leading row of turbines extract energy from the wind, less energy is available for downstream turbines. Active Wake Control technologies (AWC) are able to manipulate the wake interaction in wind farms in order to increase Annual Energy Production. The technology has been investigated over the last 20 years and has started to be applied in wind farms in pilot project campaigns. However, there are still challenges to overcome and make the wide-spread implementation in the future closely packed offshore landscape of the North Sea possible. Wake models used for wind farm control come short in reproducing the dynamics for wind farms of complex layouts.

Doelstelling

At the end of this project, an improved version of TNO's public Active Wake Control Validation Methodology suitable for validating campaigns in clusters of wind farms will be made available. This will be tested with data from a measurement campaign in a wind farm surrounded by neighbouring farms and best practices shared. On top of this, current wake models used for wind farm control will be evaluated in their ability to predict both the velocity deficit and redirection of the wake.

Korte omschrijving

Furthermore, farm to farm and interaction presents a degree of higher complexity to model. The CliF

Projectinformatie / Project information

Projectnummer / Project number

TKITOE_WOZ_2212_WOZ_CliF

Subsidiebedrag / Grant amount

€ 225.303,00

Algemene informatie / General information

Penvoerder / Secretariat

TNO

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project will assess the suitability and improve current wake models to reproduce the interaction in clusters of wind farms in terms of velocity deficit and turbine power production. Furthermore, the validation of AWC campaigns has been limited so far. TNO has developed and published the Active Wake Control validation methodology, a dedicated statistical methodology to quantify the gains from AWC based on data collected from offshore measurement campaigns. This has been tested in detail for one wind farm only. The CliF project will continue to develop the methodology in order to be applicable for validation of campaigns in clusters of farms by developing techniques suited to better estimate inflow conditions in clusters of farms. In addition, wake models will be assessed in their ability to predict the redirection of the wake by evaluation data from the same measurement campaigns.

Resultaat

The results from this project will increase the confidence in AWC control solutions in the future landscape of the North Sea and increase the speed with which industry up-takes these technologies, leading to increases in Annual Energy Production and consequently decrease in the Levelized Cost of Electricity.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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